

What is claimed is:

1. An ellipsometer for optically inspecting a subject, the apparatus comprising:

5 a source for generating an electromagnetic probe beam having a known polarization state;

an objective lens for focusing the probe beam on the surface of the subject, the objective lens also collecting the probe beam after it has been reflected by the subject;

10 a rotating compensator for inducing phase retardations in the polarization state of the probe beam;

an analyzer positioned to interact with the probe beam;

a detector for measuring the intensity of the probe beam after the interaction with the analyzer; and

15 a processor for evaluating the sample based on the outputs of the detector, the processor configured to measure and eliminate the ellipsometric effects of the objective lens.

2. An ellipsometer as recited in claim 1, wherein the processor is configured to:

20 perform a harmonic analysis on the output signal from the detector to determine normalized Fourier coefficients corresponding to 2ω and 4ω components that are included in the output signal;

25 use the Fourier coefficients to measure the retardation δ_B and the azimuth angle Q_B of the objective lens; and

use the retardation δ_B and the azimuth angle Q_B to measure and eliminate the ellipsometric effects of the objective lens.

3. An ellipsometer as recited in claim 2, wherein the detector is subdivided to provide eight coefficients for measuring the retardation δ_B and the azimuth angle Q_B of the objective lens.

4. An ellipsometer comprising:

a light source for generating a probe beam of radiation

an optical element for focusing the probe beam substantially normal to the surface of the sample such that various rays within the focused probe beam create a spread of angles of incidence;

a rotating compensator for retarding the phase of one polarization state in the probe beam with respect to the phase of the other polarization state in the probe beam;

a polarizer for creating interference between the two polarization states in the probe beam after the probe beam has been reflected from the surface of the sample;

a quadrant detector for measuring the power of the reflected probe beam after it has passed through the retarding and polarizing means, each said quadrant of the detector generating an output that integrates the intensity of various rays having different angles of incidence, and

a processor for analyzing the output of the four quadrants based on measurements taken when the compensator is in two different azimuthal positions in order to determine the changes in the phase in the probe beam induced by the focusing optical element.